

Hydrogenous Polymer-Regolith Composites for Radiation-Shielding Materials, Phase I

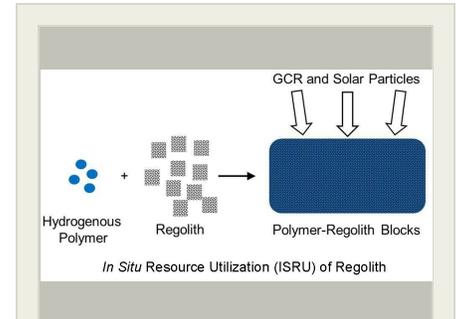
Completed Technology Project (2015 - 2015)



Project Introduction

NASA has identified a need in Sub-topic H11.01 for advanced radiation-shielding technologies using in situ resources, such as regolith, to protect humans from the hazards of galactic cosmic radiation (GCR) during extra-terrestrial missions. The radiation species of greatest interest are light ions (particularly protons), heavy ions (such as iron-56) and neutrons. International Scientific Technologies, Inc., in conjunction with The College of William and Mary, proposes the use of regolith combined with hydrogenous polymers to develop radiation-shielding structural materials for habitats. The program Technical Objectives include selection of hydrogenous polymer binders for use in regolith radiation-shielding materials, fabrication of polymer-regolith specimens designed to shield against galactic cosmic radiation species and to act as structural components in habitats, and acquisition of test data to determine key parameters for the development of optimal radiation-shielding regolith-composite materials. The innovation is the development of polymer-regolith composites for structural radiation-shielding materials to protect humans on deep-space missions. The anticipated result is the creation of composite materials that combines in situ resource utilization (ISRU), i.e. regolith, with a hydrogenous polymeric matrix. Additives, such as boron, could be included to enhance absorption of neutrons generated by interactions of GCR and SPE particles with shielding materials. The proposed composites have multifunctional properties of radiation shielding against galactic cosmic radiation, neutrons and electromagnetic radiation, and structural integrity to permit use in habitats.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
International Scientific Technologies, Inc.	Lead Organization	Industry	Dublin, Virginia
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations
Virginia

Project Transitions

June 2015: Project Start

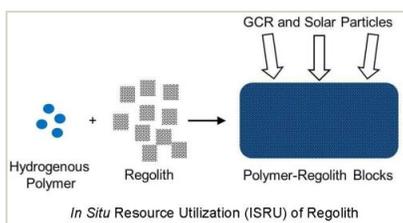
December 2015: Closed out

Closeout Summary: Hydrogenous Polymer-Regolith Composites for Radiation-Shielding Materials, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image(<https://techport.nasa.gov/file/138968>)

Images



Briefing Chart Image

Hydrogenous Polymer-Regolith Composites for Radiation-Shielding Materials, Phase I
 (<https://techport.nasa.gov/image/130283>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

International Scientific Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Russell J Churchill

Co-Investigator:

Eugene C Aquino

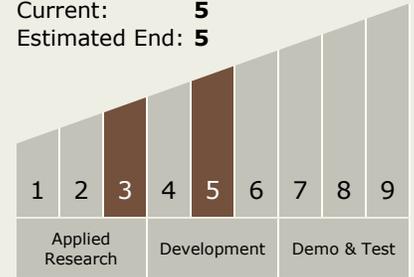
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Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.5 Radiation
 - └ TX06.5.3 Protection Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System